

Waves, Currents, & Bathymetric Evolution Near An Inlet (N00014-10-10237)

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OVERALL OBJECTIVES

The long-term objective is to develop field-verified models for the wave fields, circulation patterns, and morphological evolution near inlets and river mouths. Our approach is to collect and analyze field observations of waves, currents, winds, and bathymetry to test hypotheses and to calibrate, evaluate, and improve numerical models.

SPECIFIC OBJECTIVES FOR FY 2010

The objectives for 2010 were to:

- Participate in meetings to plan a comprehensive program to study river mouths and inlets,
- Decide upon and visit a site for field work,
- Design an inlet-river mouth sensor array using numerical model simulations.

TASKS COMPLETED:

The New River Inlet, NC, near Camp Lejeune was selected as the first site for field observations. A small team of investigators and technicians visited the site in fall, 2010 and made some preliminary measurements of currents with drifters (Figure 1). Based on these observations, as well as input from colleagues conducting remote sensing and numerical simulations, we designed an experiment array (Figure 2).

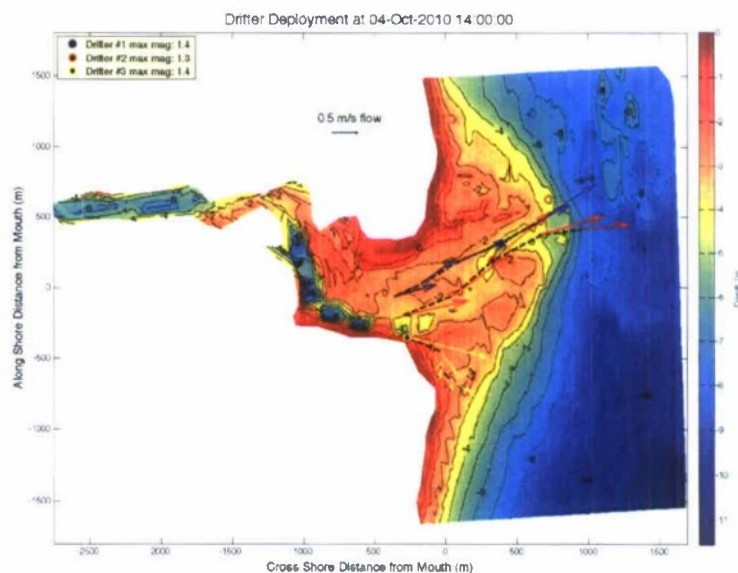


Figure 1: Drifter tracks (colored arrows) during ebb flows at New River Inlet, NC. Color contours are water depth (red is above sea level, blue is deeper water, scale on the right). GPS drifters were released near the inlet mouth (cross-shore distance = -250 m) and tracked as they traveled offshore. Maximum speeds along each track are listed in the legend.

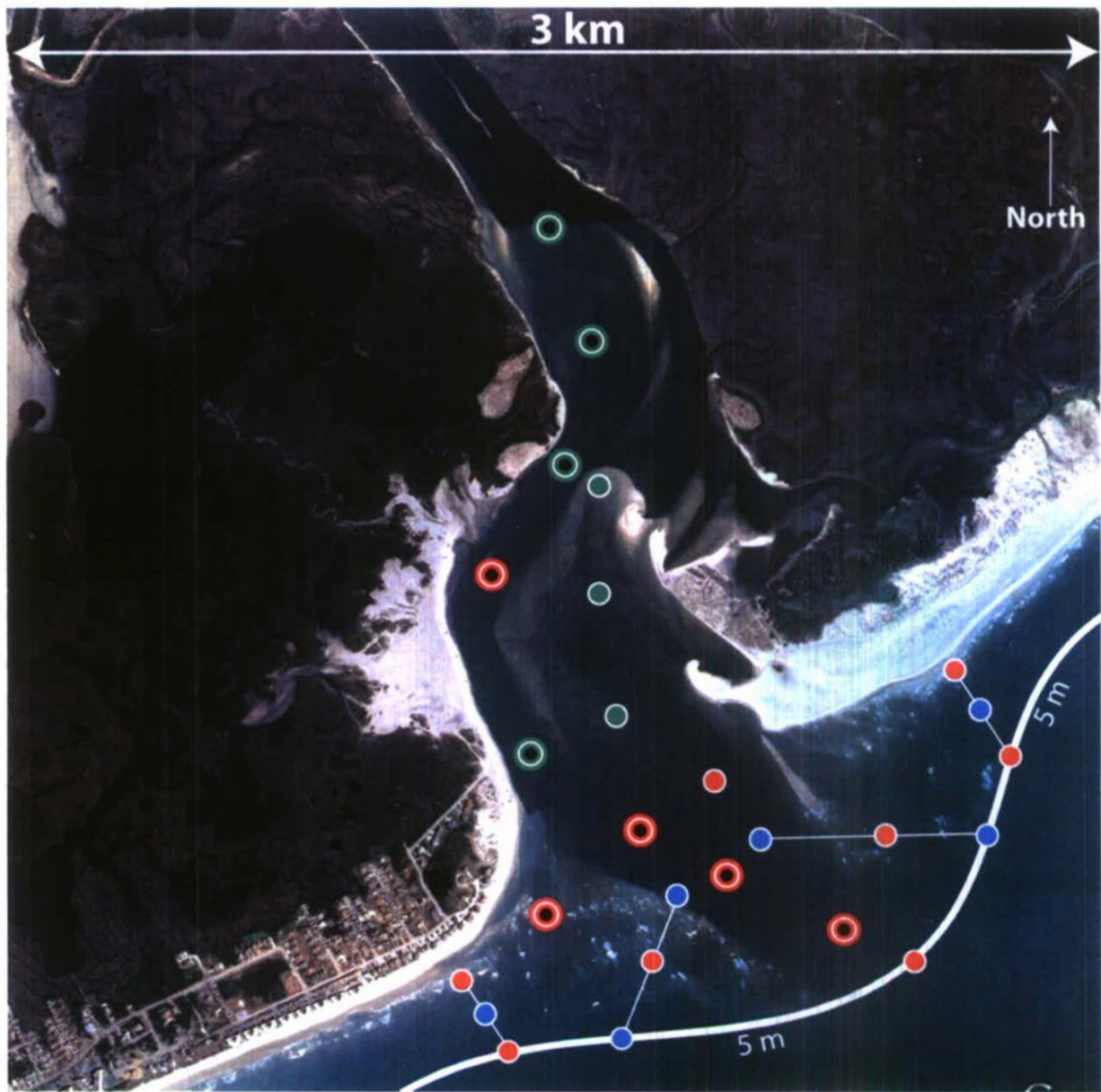


Figure 2. Aerial photograph of New River Inlet, NC with an array plan superposed. The larger symbols (red and green) with black bull's-eye centers are current profilers colocated with pressure gages. The small symbols (red, green, and blue) are current meters colocated with pressure gages. The white curve offshore of the inlet is the 5-m depth contour. The thin white lines show cross-ebb-shoal and cross-shore transects. The red symbols are the primary array to observe the wave-, setup-, and tide-induced circulation near the inlet mouth and throughout the ebb shoal. The green symbols extend the array to observe the currents into the inlet and to provide information for bathymetric inversion of in situ and remotely sensed observations. The blue symbols extend the array to provide observations of wave refraction, wave-current interaction, and wave shoaling in the presence of a strong inlet flow.

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